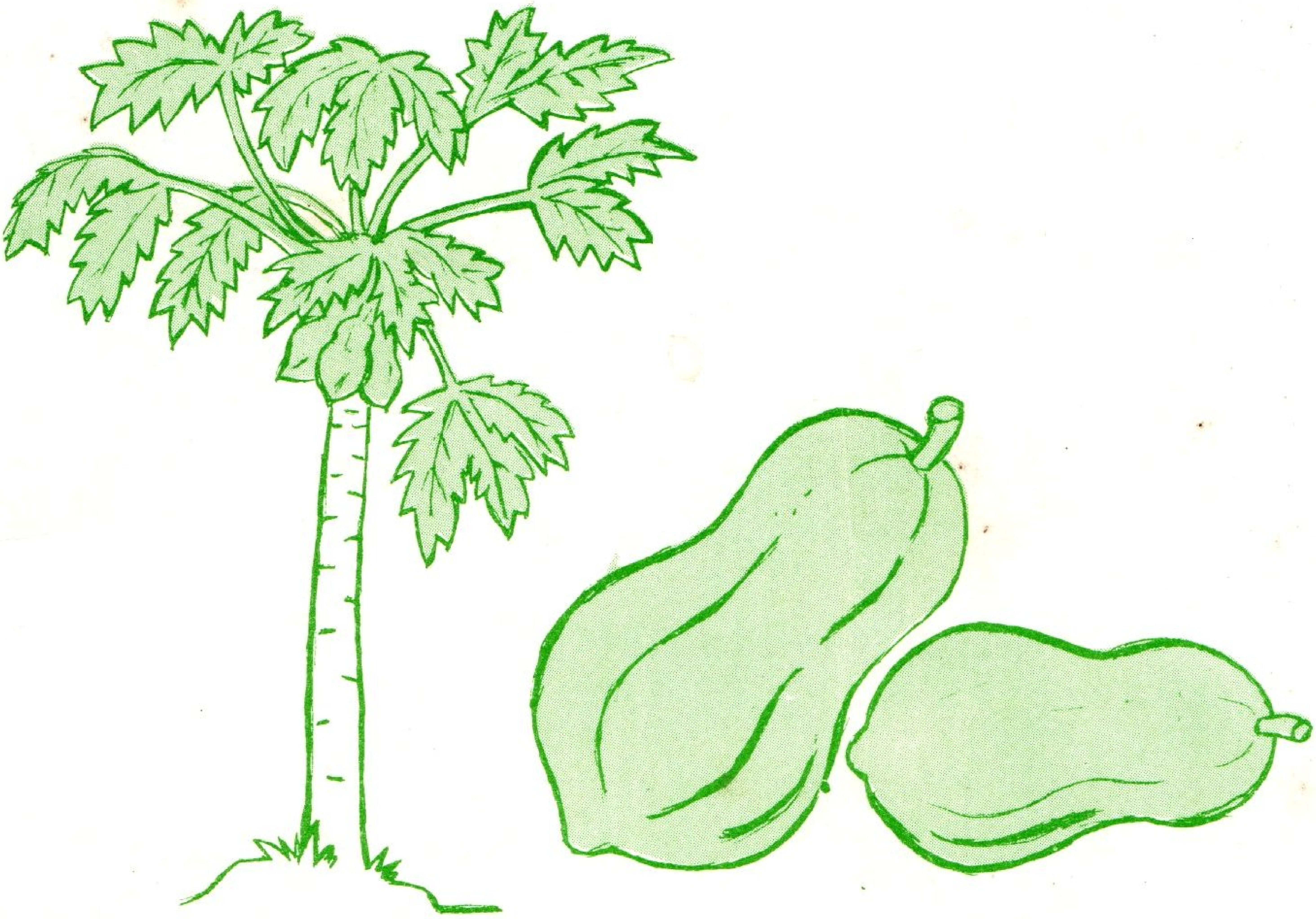
Practical Guide to

PAPAYA PRODUCTION FOR PROFIT THROUGH ORGANIC FARMING



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Technology and Livelihood Series

PRACTICAL GUIDE TO PAPAYA PRODUCTION FOR PROFIT THROUGH ORGANIC FARMING

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Technology and Livelihood Series

PREFACE

This practical guide to papaya production for profit is designed for papaya growers using zero chemical farming in order to produce papaya fruits free from residues of chemicals which are injurious to the health of our people.

Organically grown papaya are more nutritious, more sweeter, contains higher protein content, and more palatable to eat.

Papaya grown organically are heavier in weight, compared to chemically grown. In storing the fruits, organic papaya will stay longer in compared to chemically grown papaya. Chemically grown papaya deteriorate faster than organically grown papaya.

The consuming public prefers to buy organically grown papaya than chemically grown papaya.

This practical guide to papaya production through organic farming uses compost and organic foliar fertilizer for plant nutrition and uses organic pesticides and organic fungicides and Bio-Grow Microbial Inoculant for controlling pests and diseases and other practices without using chemicals.

This practical guide to papaya production the organic way is dedicated to papaya growers using organic fertilizer organic pesticide/organic fungicide/Bio-Grow Microbial Inoculants and Organic Foliar fertilizer.

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CLIMATIC AND SOIL REQUIREMENTS

Papaya is native to tropical America, probably Southern Mexico or Central America. Soon after the discovery of the New World, it was introduced to other areas and is now grown commercially in subtropical regions. It does best in the warm tropics where the temperature does not go beyond110 degree F.

Cool weather reduce growth, yield and fruit flavors. Excessively cool and humid nights cause slow fruit maturity.

Papaya grows best in light, well – drained soils, rich in organic materials. The plants will grow in clay soil, but not well because of poor aeration and poor drainage condition.

Papaya roots are sensitive to standing water, two days immersion is fatal for the plant.

Papaya can grow on soils with soil pH ranging from 5.7 to 7.0. For best results, both in quality and production volume, have been observed in pH 6.0 to 6.7.

Papaya with its large leaves, succulent stems and heavy fruits, the plant in vulnerable to strong winds. The trees can stand winds up to 50 mph if the trees have deep, well – developed root system. It is very important to select planting sites free of strong winds. If this is not possible, plant windbreaks such as neem trees, ipil-ipil or other trees around the plantation to break the wind.

Papaya grow best at nearly sea level. For high-grade commercial production, papaya plantation is best planted at elevation below 550 meters.

CULTURAL REQUIREMENTS

Land preparation for papaya orchard is similar to preparation for other upland crops. Good land preparation is very important for the fast growth of the papaya plants. This will also help in the development of a well developed – root system to have a sturdy and uniform plant growth.

Cut/slash weeds and other vegetation and other trash before plowing. Disc plow 2 to 3 at depth of at least 12 inches. The second round of discing should be done across the first round.

Subsoiling or deep plowing in necessary in shallow clay soils underlain by hard pan.

If working animals are used in plowing make sure that at least 3 plowing in necessary and at a desired depth of tillage.

For low lying portion of the land, provide with proper drainage. Water logging is not suitable for papaya plantation as it encourages stem and root rot.

For lands with deep hard – pan, deep plowing may be necessary to break the compacted soil.

Application of Compost or animal manure after the final plowing is highly recommended.

- Apply at least 3 tons of animal manure or 2 ton enrich processed compost per hectare.
- Spread the animal manure or compost evenly
- After spreading the animal manure or processed enriched compost, spray with Bio-Grow Microbial Inoculant.
- For Bio- Grow Microbial Inoculant

1 Liter Bio-Grow Microbial Inoculant mix with 1 liter molasses or 1 kilo brown sugar and then mix with 1,000 liters of water or 5 drums of water.

Spray the solution to the newly applied field compost or animal manure.

The purpose of spraying Bio-Grow is to increase the microorganism in the soil to help a faster decomposition of animal manure or compost.

Bio-Grow Microbial Inoculant will act as a BIO-CONTROL AGENT IN THE SOIL. For preventing fungal or bacterial pests and diseases in the soil so that plants will be resistant to the attack of pests and diseases.

TRANSPLANTING

(1) Before transplanting

Bore/dig a 25 cm diameter by 25 – cm deep hole at the center of the marker stakes. Place 15 to 20 kilos of enriched processed compost of pre-plant hole then cover with a thin layer of top soil. This will serve as your pre-plant media.

(2) Transporting the Seedling

Use only seedlings or buy seedling from reliable or registered nurseries. Handle the seedling with care to avoid damages. For seedling from the nurseries to the farm, use wooden crates or bamboo baskets to avoid damage of the seedling.

(3) Actual Transplanting

Area should be clean and free of weeds at the time of planting

- Stake out the area to be planted using a planting design.
- Follow a 2.5 m X 3.0 m plant spacing which will result to a density of 1,370 hills per hectare.
- Carefully remove the seedlings from the polybag, making sure that the soil is intact.
- Place the seedling carefully in each hole.
- Cover the base with fine top soil and press gently around the roots to facilitate rapid and vigorous plant growth.
- Cover the newly planted papaya seedlings with banana bracts.
- Replant missing hills and all weak seedling 10 days after the first planting.
- Repeat the operation immediately when necessary to maintain uniform plants.

Cover the newly planted papaya seedlings with banana bracts.

FERTILIZATION

Papaya is fast growing crop which need abundant supply of nutrients at all time、 To ensure good plant growth and high quality fruit yields, fertilizer should be applied at frequent intervals and at right rates.

- Apply the recommended dosage of compost (fertilizer) by evenly distributing the materials around the plants at a distance of approximately1 foot for plants between 1 to 5 months old and 1 ½ feet for 6 months or older. Use the round band method of fertilizer application.

- Cover the fertilizers with soil to keep it from evaporation or being washed away by water.

- For organic foliar fertilizer, apply weekly by spraying to the leaves of the papaya plants.

ORGANIC WAY OF FERTILIZATION

RECOMMENDED FERTILIZER APPLICATION

Age (months)	Rate of enriched Compost application	Rate per hill per month
1 to 3		5 kilos
4 to 7		7 kilos
8 to older		9 kilos
8,12,18 (months)		11 kilos

FOR ORGANIC FOLIAR FERTILIZER APPLICATION

Weekly application or spraying of Hi–Per Organic Foliar Fertilizer at the rate of 2 to 4 tablespoon per gallon of water.

FOR BIO-GROW MICROBIAL INOCULANT APPLICATION

Every 15th days spraying of Bio – Grow Microbial Inoculant is highly recommended.

One (1) liter Bio-Grow Microbial Inoculant mix with 1 liter molasses or 1 kilo brown sugar. Mix the solution with 5 drums or 1,000 literss water (For spraying).

One (1) liter Microbial Inoculant (BIO–GROW) mix with 1 liter molasses or 1 kilo brown sugar. The solution should be mixed with 500 liters water or 2.5 drums water for drenching to the soil around the plants at the distance of 1.5 feet from the base of the plant.

Repeat the above procedure every 15th days or twice a month application.

IRRIGATION

Papaya needs sufficient amount of water from transplanting until the time of fruiting stage. Water is a major factor in papaya production. Under favorable conditions, it is possible to double production with irrigation water. Papaya plant requires plenty of water. Newly established plants can tolerate dry season, but when flowering starts, a week of dry weather can cause the flower to drop. Older plants can stand or more resistant to drought because they have a slower vegetative growth and deep and extensive root system, but the yield will be low when water is not sufficient.

Observe the following condition in growing papaya.

- Transplant the seedlings during the rainy season when the days are cloudy to assure good plant start.
- After transplanting, make sure the plants get adequate water every 2 to 4 days until they are well established.
- Water the plants regularly when the climate is dry or hot to prevent retardation of the growth, flower abortion and dropping of young fruits.
- Mulching is highly recommendation to reduce moisture loss and to prevent weed growth. A mulch of rice straw or grasses or saw dust one foot from the base of the plant is highly recommended.
- During long dry season, irrigate the plants at least weekly to make sure that they are provided with enough water. Do not over irrigate.

- Have an adequate drainage system in your plantation to drain excess water.
- In high rainfall areas, and water logged is a problem, construct drainage canals. Construction of canals at 1.0 X 1.5 meters on every other rows is recommended. Lateral canals of 30.0 X 45.0 cm spaced at every 4-5 plants in a row is recommended. Consult an agricultural engineer for irrigation and canal system.

Papaya will also grow with other crops, such as root crops but the yield will not be as high compared to planting a pure stand of papaya.

CONTROLLING WEEDS

Weeding is necessary in papaya plantation to keep plants healthy and to ensure high yields. Weeds share the nutrients from the soil and the fertilizer applied to the papaya plants. Weeds are also vectors or carriers of pest and plant diseases.

- Ring weed in newly planted fields. Clean an area of 1 meter radius around the base of the plants.
- In the field newly established, plowing in between rows of papaya is highly recommended when the plants are still small.
- Slash tall grasses/weeds between plants.
- Maintain the cleanliness at all times.
- Weeds can cause a 25% reduction of the productivity of your papaya plants.

Weeding is necessary in papaya plantation.

PLANT SELECTION /FRUIT SELECTION AND CARE/GENERAL FIELD SANITATION

Groups of papaya plants are 3 basic type of sex: according to the flowers they produced – male, female and hermaphrodite.

Hermaphrodites are the best of the three followed by the females. Hermaphrodites bear big fruits with thick flesh and have good flavor.

There are no reliable distinguishing characteristic of the male, female and hermaphrodite plant until they bear flowers. This is the reason why we have to plants 3 plants per hill and allow to grow on each hill until flowering. The plants bear flowers about 5 to 6 months after germination. When the flowers appear and the sex of the plants can be determined, ELIMINATE THE MALE AND THE UNDESIRABLE PLANTS. Leave only one healthy and vigorous plant which is hermaphrodite or female (in the absence of the hermaphrodite) plant per hill.

Some plants that were selected may bear undersized and misshapen fruits aside from the big and good ones. Others may produce too many fruits which would hardly reach normal or marketable size. To favor the growth and development of desirable fruits, remove all undersized, misshapen and other undesirable fruits as early as possible.

The following should be done in field:

- Remove side growths along leaf axles that occur during the early stages of plant growth. They compete with plant nutrients needed by the plants. These parts can also harbor diseases and pests.

- Always observe field sanitation. Clean fields minimizes spread of diseases and pests.

- Regularly remove diseased and dried leaves. These area provide good breeding places of pests and diseases.

- Cut down and carry away blown down and diseased trees from the field. Diseased fruits and leaves will be removed and buried or burned.

PROPPING

Propping is necessary to support the growing plants, especially during fruiting stage.

- Use bamboo as propping materials or wooden poles.
- Prop only leaning plants. Observe what direction the plant is leaning to. This is where you place your poles keeping in mind to counteract gravitational force.
- Use two poles by forming an X placed along the center of gravity of the plant. Wrap or cushion the point of the plant where the poles are tied with used fertilizer bags to avoid hurting the plant. Cut or removed wounded stems may induce stem rot.

PEST AND DISEASE CONTROL

Pest and disease control are very important factors for good growth and productivity of papaya plantation. Closely observe all parts of the plants (leaves, stem and roots), from time to time and observe any unusual presence of insects or abnormalities of the plants.

Insects and Control Measures

INSECTS	CONTROL/ PREVENTION
❖ ANTS - small to large, yellow, Red brown or black winged or Wingless ants. Lives in colonies	CONTROL – regular handweeding at the base of the plant to disturb foraging ants and nests. Maintain a weed-free area at the base of the plant, the diameter of which is the same as the plant canopy.
❖ MEALYBUGS - flattened oval Insects (1 to 4 mm long). They transmit a viral disease known as leaf drop and will cause a reduced yield	HI–PER ORGANIC PESTICIDE – Spray at the rate of 2 - 4 tablespoons on per gallon water. Lower the population thru spraying Organic Pesticide.
Note: If you control the presence of the ants, Mealybugs infestation is also controlled	
❖ APHIDS – These are tiny lice-like insects with color ranging from pink, yellow brown to black. They can transmit to viral disease known as rosette.	CONTROL – Spray Hi–Per Organic Pesticide at the rate of 2-4 tablespoon per gallon water.

❖ ARMY & CUT–WORMS – the larvae feeds on young and mature leaves of the host plants, making large holes on the leaves.	CONTROL – spray the leaves and stem after emergence of Organic Hi–Per Organic Pesticide at the rate of 2 - 4 tablespoon per gallon of water. Repeat procedure every two weeks.
❖ GRUBS (Japanese Beetle) As the larvae grow older, they become voracious and feed on the roots.	CONTROL – Hi–Per Organic Pesticide. Use 2 - 4 tbsp. of Organic Pesticide per gallon of water. Using an empty small tin size of tinapa, apply one can direct to the soil around the base of the plant.
❖ SCALE INSECTS – round, oval, pear-shaped flattened scales of various color on trunk or fruits.	CONTROL – spray Hi-Per Organic Pesticides at the rate of 2 - 4 tbsp. per gallon of water.
❖ RED SPIDER MITES – tiny 8 legged yellow, dark green or reddish "spiders" on the underside of foliage. Mites prefer to feed on every plant tissues. They can transmit viral disease.	PREVENTION – heavily infested parts (branches and leaves) should be pruned and buried. This should be followed by pesticide spray application. Use clean planting materials free from any infestation. CONTROL – Hi-Per Organic Pesticide Spray at the rate of 2 - 4 tbsp. per gallon of water.
❖ THRIPS – tiny elongated, winged dark brown or black adults – white or yellow when young.	CONTROL – Hi-Per Organic Pesticide. Spray at rate of 2 - 4 tbsp. per gallon of water. Spray on the leaves and stems. Repeat every two weeks.
❖ WHITEFLIES – minute winged insects.	CONTROL – Hi-Per Organic Pesticide. Spray 2 - 4 tbsp. of Organic Pesticide per gallon of water. Spray on leaves and stems every two weeks.

DISEASES (PREVENTION and CONTROL)

ANTHRACNOSE DISEASE – Infects the leaves and fruits ripening portion of the fruits develop small, water soaked circular area which enlarge as the fruits ripens. Lesions are sunken and usually turns brown or black. It also invades the petioles of the lower leaves.

CONTROL – Hi-Per Organic Fungicide. Spray Fungicide 2-4 tbsp. per gallon of water. Spray the affected areas every 7 to 10 days intervals, observing shorter cycle during the rainy and humid months.

PREVENTION – Before planting the field, apply enriched compost at the rate of 2-3 tons per hectare. Spray the applied field with compost BIO-GROW MICROBIAL INOCULANT. 1 liter Bio-Grow + 1 liter molasses + 1,000 liters water, then spray the solution to the field applied with compost. This method will eliminate harmful fungus in the soil.

CONTROL – HI-PER ORGANIC FUNGICIDE. Mix 2 - 4 tbsp. of ORGANIC FUNGICIDE per gallon of water.

Procedure:

For root rot – apply 4 tinapa cans of solution per hill.
For stem rot – brush or spray around infected area.
For fruit rot – spray around infected area.

PREVENTION – Removal of infected plants and fruits from the field and disposing it properly.

❖ VIRAL DISEASES	PREVENTION
a. ROSETTING – shortening of the internodes.	❖ Application of enriched compost. Compost tailored as Bio-Control agent for the control of pest and diseases.
b. CHLOROSIS – weakening of the green color of the leaves.	
c. YELLOWING – Chlorosis and dominance of yellow color of the leaves.	Application of compost at the rate of 2 to 3 tons per hectares.
d. PAPAYA LEAF CURL – Curling and curving of leaves with margins rolled down and inward.	After the application of compost, spray BIO-GROW MICROBIAL INOCULANT. 1 liter BIO-GROW + 1 liter molasses + 1,000 liters of water, then spray the solution to the field applied with compost. This should be done before planting.
e. MOSAIC – Pale green, yellow or Chlorotic areas sharply bordered by small veins of the leaves that are angular in appearance.	
f. MOTTLE – Discolored areas of various rounded shapes, often diffusely bordered.	
g. LEAF SPOT – Single or concentric rings of chlorotic or necrotic areas to large irregular patches of the leaves.	❖ Control all insects that are virus carriers like aphids, whiteflies, leafhoppers, mealybugs, thrips and mites or insects that produce viral diseases with Organic Pesticide.

h. VEIN CLEARING – Veins Appearances of the leaves are Transluscent rather than Chlorotic or yellow.	* Use Hi-Per Organic Pesticides and Fungicides. * Eliminate weeds and other plants which are virus alternate host like Kalabasa, Sitao and Lima beans. * Rouge and bury or burn infected plants to destroy the virus source. * Disinfect all tools and equipment being used to cut any parts of the plant after each use in every plant. Use 3% formalin or aniline solution.

HARVESTING

Papaya fruits shall be harvested when 25% or ¼ of the fruits ripen. Handle the fruits carefully to avoid bruising and unnecessary cuts. During the harvesting do not drop fruits to the ground. Gently pick off papaya fruits by hand from the stem and pile then carefully into the fruit boxes. On tall plants, use a ladder to reach the fruit. Fruits should be harvested and delivered to the center point within 24 hours from time of harvest. Heavily bruised, damaged, diseased, over-ripe, or old fruits should be separated from the good ones.

Schedule harvesting at least twice a week to minimize incidences of over-ripe fruits.

GENERAL INFORMATION

1. The compost (enriched compost) tailored as bio-control agent for the control of fungal and bacterial diseases of plants (papaya) is recommended by OFAI Organic farming expert. Compost recipe tailored for fungal prevention and bacterial prevention of papaya.

2. Bio-Grow Microbial Inoculant is prepared by OFAI expert from the beneficial microorganism for application or for spraying to the field applied with compost or no compost application to increase the beneficial microorganism in the soil for better utilization of nutrients by the plants in the field.

3. Application of BIO-GROW to the field. 1 liter of Bio-Grow mix 1 liter molasses or 1 kg of brown sugar. Add 1,000 liters of water to the solution (for spraying to the field or soil or to the plants.)

4. HI-PER ORGANIC PESTICIDES. Prepared and formulated by OFAI organic farming expert/ soil scientist. Organic pesticides are environment friendly. It controls pests attacking papaya plants such as aphids, mites, ants, thrips, mealybugs, whiteflies, spider mites, leafhoppers, worms, beetles, scale insects and other pests that act as vectors for spreading papaya diseases.

5. HI-PER ORGANIC FUNGICIDES. Prepared or processed by OFAI organic farming expert/soil scientist. Organic fungicides are environment friendly. It controls fungus and bacterial organisms attacking papaya plants such as phytophora disease, anthracnose diseases, and other fungal diseases attacking papaya plants.

6. HI-PER ORGANIC PESTICIDES ARE DERIVED FROM PLANTS SUCH AS: Neem, Madre de Cacao, Ipil-ipil, Red Hot Pepper, Tobacco leaves, and stems, Onion, Garlic, Compost tea, Lemon grass, etc.

7. HI-PER ORGANIC FUNGICIDES are derived from plants such as garlic, onion, lagundi, vinegar, vinegar + fermented sugar, Madre de Cacao leaves, Ipil-ipil leaves, sensitive plants, compost tea, etc.

8. HI-PER ORGANIC FOLIAR FERTILIZER – derived from plants and human urine: such as neem, Madre de Cacao, Ipil-ipil leaves, Legume leaves, Urine, etc.
   HI-PER ORGANIC FOLIAR FERTILIZER is processed or prepared by OFAI organic farming expert (Hi-Per Organic Foliar Fertilizer)

9. HI-PER ORGANIC PESTICIDES AND HI-PER ORGANIC FUNGICIDE are recommended by OFAI organic farming experts for the control of pests and diseases of papaya.

10. For information where to buy or purchase:
    a. Compost tailored as BIO-CONTROL agents for fungal and bacterial diseases.
    b. Organic Foliar fertilizer (homemade) tailored for papaya production.
    c. Organic Pesticides (homemade) tailored, for controlling pests attacking papaya plants.
    d. Organic Fungicides (homemade) tailored or processed for controlling papaya diseases.
    e. Bio-Grow Microbial Inoculant (Beneficial Microorganisms) for increasing beneficial microorganisms in the soil for preventing bacterial, viral and fungal diseases in papaya.

For information – Contact:

Mrs. Alma Balasbas
Salazar Street, Poblacion, Polomolok, South Cotobato
(Back of Municipal Health Center of Polomolok)
(Near the tower of DOTC Telecom Office of Polomolok)
or call Pete Cellphone No. 0918 –451-1541
or call Chito Legada or Alma Balasbas Tel. (083) 382-0003

GO ORGANIC FARMING

USE:

- COMPOST (Tailored as Bio-control agent for fungal and bacterial disease processed of OFAI organic farming expert)
- ORGANIC PESTICIDE
- ORGANIC FUNGICIDE
- BIO-GROW MICROBIAL INOCULANT (Beneficial or Effective Microorganisms)

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